

ARM Value Added Product (VAP) Monthly Status Report

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Current Production VAPs:

AERI Noise Filter

Description: The original temporal resolution of the ARM AERI instruments was 8 minutes, where each cycle consisted of a 3-min sky view period and 2-min views at each of the two blackbody targets. This sampling strategy was chosen to achieve the desired signal-to-noise ratio for clear sky spectroscopy and profiling studies. To make the AERI observations more useful for cloud research, the temporal resolution has been decreased by an order of magnitude; however, this greatly increases the random error in these observations. This VAP utilizes a principal component analysis noise filter to significantly reduce the amount of uncorrelated random error in the AERI observations. The noise-filtered “rapid-sample” AERI observations have approximately the same amount of random error as the original AERI radiance data.

WG/Science Sponsor: RPWG / Dave Turner and Bob Knuteson

Translator: Dave Turner

Status: Runs in batch mode, approximately every 2 weeks, for SGP CF and NSA Barrow AERIs. Data current unless otherwise noted. VAP will be applied to TWP Nauru and Darwin, and AMF, as those AERIs migrate to rapid-sample operation.

AERI PROF (AERI Profiles)

Description: High temporal resolution temperature and water vapor profiles through the planetary boundary layer are retrieved from high resolution spectral data observed by the Atmospheric Emitted Radiance Interferometer (AERI).

WG/Science Sponsor: RPWG/Wayne Feltz

Translator: Jennifer Comstock

Status: Currently only running on SGP Central Facility data. Run daily, data up through current unless otherwise noted. **Currently runs daily on original AERI-01 instrument and is being modified to run for newer model AERI instruments at SGP and other sites.**

AIP (Aerosol Intensive Properties)

Description: This VAP computes several aerosol intensive properties. Intensive properties are independent of aerosol amount, depending only on the nature of the specific aerosol. The intensive properties of hygroscopic growth factor, aerosol single-scattering albedo, hemispheric backscatter fraction and angstrom exponent are produced at a one minute sample rate. The submicron scattering and absorption fraction are produced on an hourly sample rate. This data product is a required input for AOS Corr and AOS Fit RH, precursors to ABE and BBHRP.

WG/Science Sponsor: AWG, Ogren

Translator: Flynn

Status: Run daily for SGP and AMF, data up through current unless otherwise noted. **Stopped, requiring maintenance. Last available data 9/30/2005.**

AOS Fit RH (Aerosol Observing System Fit RH)

Description: This VAP computes the aerosol scattering humidification factor from dry and humidified aerosol scattering data generated by AOS Corr. It is a direct input for ABE, a precursor to BBHRP.

WG/Science Sponsor: AWG, Ogren

Translator: Flynn

Status: Run daily for SGP and AMF, data up through current unless otherwise noted.

Stopped, requiring re-release.

SGP: Last available data 6/30/2006.

AMF: PYE and NIM deployments are fully processed.

ARSCL (Active Remote Sensing of Cloud Layers)

Description: The Active Remote Sensing of Clouds (ARSCL) VAP combines data from multiple active remote sensing instruments to produce an objective determination of cloud hydrometeor height distributions and estimates of their radar reflectivities, vertical velocities and Doppler spectral widths, which are optimized for accuracy. These data provide fundamental information for retrieving cloud microphysical properties and assessing the radiative effects of clouds on climate. Much of the algorithm's calculations deal with merging and optimizing data from the radar's sequential operating modes, which have differing advantages and limitations.

WG/Science Sponsor: CPWG / Eugene Clothiaux

Translator: Michael Jensen

Status: ARSCL is currently operational in batch mode at BNL. Availability via ARM archive: SGP – 11/1996 thru 6/2006, NSA – 3/1998 thru 9/2006, TWP C1 – 7/1999 thru 12/2004, 10/2006 thru 12/2006, TWP C2 – 11/1998 thru 11/2005, 10/2006 thru 12/2006, TWP C3 – 1/2006 thru 8/2006.

BAEBBR (Bulk Aerodynamics Energy Balance Bowen Ratio)

Description: Best-estimate of sensible and latent heat fluxes from Energy Balance Bowen Ratio (EBBR) station measurements and bulk aerodynamics calculations. The BAEBBR VAP calculates the bulk aerodynamic latent and sensible heat fluxes from EBBR station meteorological measurements and uses these in place of the EBBR flux measurements when the Bowen ratio is between -1.6 and -0.45. The resultant dataset is considered to provide the "best estimate" of the diurnal cycle of fluxes.

WG/Science Sponsor: CMWG/David Cook

Translator: Shaocheng Xie

Status: Run daily, data up through current unless otherwise noted, for all SGP sites with EBBR data. Not running due to errors found in the BAEBBR VAP programming. The old code used fixed AEM (top; 1.9 m and bottom; 0.9 m) and wind speed sensor heights to generate the BAEBBR VAP, instead of site specific heights (which have ranged from 1.5 to 3.11 for the top height). This problem requires a complete re-run of the VAP program for the many years of EBBR data (from the start of the keeping of vegetation height). Estimated time for resumed operations is around the summer 2007. Data available from 10/1/1995 to 6/30/2003.

BE FLUX (Best-estimate Surface Radiative Flux)

Description: The Best Estimate Flux (BEFLUX) VAP processes data from three Southern Great Plains Central Facility radiometer systems when all are available. Before 2001, this VAP used corrected diffuse SW from the DiffCorr1Dutt VAP as input. The 1-minute input data are compared to decide which to use for averaging to get the best estimate of all surface radiative energy budget terms (SW and LW downwelling and upwelling). The output data are saved in two NetCDF files containing the best estimate values, QC flags, and the difference fields.

WG/Science Sponsor: RPWG/Chuck Long

Translator: Chuck Long

Status: This VAP runs for the SGP CF only. Run daily, data up through current unless otherwise noted.

IAP (In-Situ Aerosol Profile)

Description: Applies corrections to instrument-level In-Situ Aerosol Profile data to yield calibrated, quality assessed extensive aerosol properties along level flight legs.

WG/Science Sponsor: AWG, John Ogren

Translator: Flynn

Status: Runs periodically in response to irregular flight schedules, generally monthly, only at SGP CF. **Stopped. Needing maintenance to accommodate new instrument content. Last available data 9/30/2006.**

LANGLEY (Langley regression)

Description: This VAP computes Langley regressions from MFRSR and NIMFR direct beam solar irradiance measurements. The results of the Langley regressions are ultimately used as the basis for calibrations of these instruments via the MFRSROD1 Mich VAP.

WG/Science Sponsor: AWG, Michalsky

Translator: Flynn

Status: Run daily at all sites with MFRSRs or NIMFRs, data up through current unless otherwise noted.

LBL CLOUD E (Line-by-Line Cloud Emissivity)

Description: Computes high-spectral-resolution infrared cloud emissivity spectrum from AERI observations and clear sky calculations from the line-by-line radiative transfer model LBLRTM. The original purpose was to develop a "climatology" of cloud emissivity for inclusion in fast radiative transfer models.

WG/Science Sponsor: RPWG/ Tony Clough

Translator: Chuck Long

Status: Stopped, needing maintenance (need to update the LBLRTM to a more current version). Last available data 8/10/1998. This VAP has been recommended as a candidate for sunseting.

LBL RTM AERI (Line-by-Line Radiative Transfer Model to match AERI)

Description: This VAP computes downwelling high-spectral-resolution clear sky infrared radiance with the line-by-line radiative transfer model LBLRTM and convolves it with the instrument response function of the AERI. This is a critical input for the QME AERI / LBLRTM VAP, which statistically compares the AERI observations and LBLRTM calculations.

WG/Science Sponsor: RPWG/ Tony Clough

Translator: Chuck Long

Status: Stopped, needing maintenance (need to update the LBLRTM to a more current version). Last available data 1/8/2005. This VAP has been recommended as a candidate for sunseting.

LBL MWR (Line-by-line calculations compared to the MWR)

Description: This VAP utilizes the radiative transfer model “monoRTM”, which is a monochromatic version of the AER line-by-line radiative transfer model (LBLRTM) to compute downwelling radiance at the 2 frequencies observed by the microwave radiometer (23.8 and 31.4 GHz). This VAP, thus, facilitates the comparison between the observations and calculations.

WG/Science Sponsor: RPWG / Tony Clough

Translator: Dave Turner

Status: Runs for SGP, NSA, and TWP Central Facilities. Stopped, needing maintenance (need to update the LBLRTM to a more current version). Last available data 7/5/2004. This VAP has been recommended as a candidate for sunseting.

LS SONDE (Liebe Scaled Sonde)

Description: Radiosonde profiles where the relative humidity profile is scaled to match the microwave radiometers precipitable water vapor. Since the model used in the MWRLOS product has been changed to monoRTM, this VAP is now inappropriately named.

WG/Science Sponsor: CPWG/ Tony Clough

Translator: Michael Jensen

Status: Runs operationally for SGP Central Facility. Run daily, data up through current unless otherwise noted. Historical data available [6/16/97 thru 10/8/00] for four boundary sites.

MFRSR CLDOD (Cloud optical properties)

Description: Cloud optical properties (optical depth and effective radius) from multi-filter rotating shadowband radiometer (MFRSR) diffuse observations at 415

nanometers, microwave radiometer (MWR) and the Langley analysis Value Added Product (Langley VAP). The retrievals are only valid for overcast liquid water clouds.

WG/Science Sponsor: CPWG/Qilong Min

Translator: Jennifer Comstock

Status: Runs at SGP Central Facility only. Run daily, data up through current unless otherwise noted. **Currently stopped because an input datastream (mfrsrlangley) is undergoing maintenance. Last available data is 24 Nov 2006.**

MFRSR OD (MFRSR Optical Depths)

Description: This VAP has four important functions. It generates robust calibrations for the MFRSR and NIMFR instruments from Langley analysis, it applies this calibration to the irradiance data, applies a moving filter cloud screen to identify cloud events, and it computes aerosol optical depths at five measured wavelengths with nominal centers at 415 nm, 500 nm, 615 nm, 673 nm, and 870 nm.

WG/Science Sponsor: AWG, Michalsky

Translator: Flynn

Status: Runs monthly at all sites having MFRSR or NIMFR. **Stopped. Maintenance finished, awaiting re-release. Last available data varies by site but generally not past Dec. 2005.**

MPL NOR (MPL Normalized)

Description: This VAP applies corrections to remove instrument artifacts from Micropulse lidar data, computes signal to noise levels, reports cloud base height and provides two cloud masks using robust and sensitive cloud detection algorithm.

WG/Science Sponsor: CWG and AWG/Campbell

Translator: Flynn

Status: Run daily for all Central Facilities, data up through current unless otherwise noted. **Stopped, needing maintenance. Changes to raw instrument data content and format require accommodation, but this is secondary to requiring new instrument corrections at all sites. Due to sensitivity of the algorithm to the systematic corrections (e.g., overlap) which are determined manually, this VAP will require periodic maintenance and some amount of reprocessing to apply updated corrections to the data after its initial processing. Last available data 2004-05-11.**

MWR AVG (Microwave Radiometer Averaging)

Description: This VAP averages the principal fields from the MWR (23.8 GHz sky brightness temperature, 31.4 GHz sky brightness temperature, Total water vapor along LOS path and Total liquid water along LOS path) over one and five minute intervals.

WG/Science Sponsor: Nancy Miller

Translator: Connor Flynn

Status: Run daily, data up through current except at AMF where it has not been run. **This VAP has been recommended as a candidate for sunseting.**

QC RAD (QC and Continuity of Surface Radiation measurements.)

Description: The QCRad VAP has been developed to assess the data quality and to enhance data continuity for the ARM surface broadband radiation data collected at the all ARM facilities. The methodology uses climatological analyses of the surface radiation measurements to define reasonable limits for testing the data for unusual data values. Data which fall outside the normal range of occurrences are labeled either "questionable" or "bad," depending on how far outside the normal range the particular data reside. The methodology not only sets standard maximum and minimum value limits, but includes many cross-comparisons based on how these instruments behave in the field in developing other VAPs, such as the Diffuse IR Loss Correction VAP and the Best Estimate Flux VAP.

WG/Science Sponsor: RPWG/Chuck Long

Translator: Chuck Long

Status: Run at all sites daily, data up through current unless otherwise noted.

QME AERI LBL (Quality Measurement Experiment AERI Line-by-Line)

Description: Observed radiances as measured by the AERI and LBLRTM calculated radiances are produced for comparison. The three principle components of this study are 1) ground-based measurements of spectral radiances, 2) characterization of the atmospheric state associated with the radiating column, and 3) evaluation of the line-by-line radiative transfer model, with the initial focus on clear sky. In addition to providing statistics over the entire spectral band from 3.3 - 18 cm⁻¹ (the range of the AERI), and statistics for each channel, the entire spectrum is divided into 17 spectral regions called "bins." These bins are disjoint intervals such that the union of them covers the entire spectrum selected to match the spectral bands for rapid radiation models in general circulation models (GCMs). To further facilitate analysis, each spectral element was associated with a specific physical process.

WG/Science Sponsor: RPWG/ Tony Clough

Translator: Chuck Long

Status: Stopped, needing maintenance (need to update the LBLRTM to a more current version). Last available data 1/8/2005. This VAP has been recommended as a candidate for sunseting.

QME AERI LBL Clouds (QME AERI Line-by-Line Clouds)

Description: Comparison of Clouds Data from the AERI vs. LBLRTM Model runs. Data from the various ceilometers, imagers, in-situ measurements, and passive sensors are gathered and then used to determine whether the column of sky directly above the central facility is non-clear. Another goal of this platform is to capture the variability of the atmospheric column, i.e., how fast it is changing over time. A natural byproduct of this compilation of different data streams all matched to the same time interval is that it can be used to compare similar data streams easily. For instance, one can compare the cloud-base height as measured by the Belfort laser ceilometer, the micropulse lidar, and a simple estimation derived from the AERI using nearby radiosonde temperature profiles. Or one can compare data between the IR thermometer and the AERI, where

the AERI data has been integrated and a filter function applied to match the IRT's spectral response.

WG/Science Sponsor: RPWG/ Tony Clough

Translator: Chuck Long

Status: Run at all sites daily, data up through current unless otherwise noted. **This VAP has been recommended as a candidate for sunseting.**

QME AERI PROF (Comparison of AERI profiles with radiosondes)

Description: This Quality Measurement Experiment routinely compares the retrieved temperature and water vapor profiles from the AERIPROF VAP with coincident radiosonde profiles.

WG/Science Sponsor: RPWG, Wayne Feltz

Translator: Jennifer Comstock

Status: Runs at SGP Central Facility only. Run daily, data up through current unless otherwise noted. **Currently stopped and undergoing maintenance. Last available data is 26 Jan 2004. This VAP has been recommended as a candidate for sunseting.**

QME LW FLUX (QME Longwave FLUX)

Description: Comparison of Longwave Flux Data from AERI, pyrgeometer, RRTM and LBLRTM. The AERI measures downwelling spectral radiance at high spectral resolution from 3.3 to 18 um; these observations are accurate to better than 1% due to frequent views of two well-characterized blackbody targets. The pyrgeometer measures downwelling flux from 3-50 um; however, this instrument is calibrated only once per year. This VAP uses the LBLRTM to extend the AERI observations from 18 um to 50 um, and then compute the wavelength-dependent factors needed to convert the high-spectral-resolution radiance into flux in order to compare the AERI and the pyrgeometer. Additionally, the longwave flux is also computed from the LBLRTM and the rapid radiative transfer model (RRTM) for intercomparisons.

WG/Science Sponsor: RPWG/ Tony Clough

Translator: Chuck Long

Status: This VAP runs for the SGP CF only. **Stopped, needing maintenance. Last available data 4/16/2003. This VAP has been recommended as a candidate for sunseting.**

QME MWR COL (QME Microwave Radiometer Column)

Description: Compares sonde profile of water vapor to MWR data from +/- 20 min before the balloon launch time. Both the PWV and brightness temps are compared. For the latter, an out-dated model is used for the MWR data.

WG/Science Sponsor: RPWG/ Jim Liljegren

Translator: Ric Cederwall

Status: Run at SGP, TWP, and NSA CFs. **Retired. Functionality replaced by MWRRET VAP. Last available data 7/5/2004. This VAP has been recommended as a candidate for sunseting.**

QME MWR PROF (QME Microwave Radiometer Profiles)

Description: This VAP routinely compute statistics (bias, RMS) between the MWRPROF profiles of temperature and humidity and radiosondes.

WG/Science Sponsor: RPWG/ Ed Westwater

Translator: Chuck Long

Status: Retired. Functionality replaced by MWRRET VAP. Last available data 7/5/2004. This VAP has been recommended as a candidate for sunseting.

RLPROF ASR (Raman Lidar Profiles – Aerosol Scattering Ratio)

Description: RLPROF ASR computes the calibrated aerosol scattering ratio (ASR) and backscatter coefficient profiles from the Raman lidar data.

WG/Science Sponsor: AWG/Rich Ferrare

Translator: Jennifer Comstock

Status: Runs at SGP Central Facility only. Run daily, data up through current unless otherwise noted. RLPROFASR has been updated to interface with new RLPROFMERGE data. This VAP will not be turned back on until RLPROFMERGE is released. Last available data is 6 Jan 2004.

RLPROF BE (Raman Lidar Profiles – Best Estimate)

Description: RLPROF BE combines the output from all other RLPROF VAPs and interpolates the profiles to a common vertical and temporal resolution. Output profiles include aerosol scattering ratio, backscatter, extinction, water vapor mixing ratio and depolarization ratio.

WG/Science Sponsor: AWG, CPWG/Dave Turner

Translator: Jennifer Comstock

Status: Runs at SGP Central Facility only. Run daily, data up through current unless otherwise noted. RLPROFBE is stopped until maintenance of input VAPs are completed. Last available data is 6 Jan 2004.

RLPROF DEP (Raman Lidar Profiles – Depolarization)

Description: RLPROF DEP computes depolarization ratio profiles and cloud optical depth using Raman lidar data.

WG/Science Sponsor: CPWG/Dave Turner

Translator: Jennifer Comstock

Status: Runs at SGP Central Facility only. Run daily, data up through current unless otherwise noted. RLPROFDEP is stopped and undergoing maintenance to interface with the new RLPROFMERGE input files. This VAP will not be turned back on until RLPROFMERGE is released. Last available data is 6 Jan 2004.

RLPROF EXT (Raman Lidar Profiles – Extinction)

Description: RLPROF EXT computes aerosol extinction profiles using Raman lidar data and the profile of extinction to backscatter ratio. Aerosol optical depth is also computed.

WG/Science Sponsor: AWG/Rich Ferrare

Translator: Jennifer Comstock

Status: Runs at SGP Central Facility only. Run daily, data up through current unless otherwise noted. **RLPROFEXT is stopped and undergoing maintenance to interface with the new RLPROFMERGE input files. This VAP will not be turned back on until RLPROFMERGE is released. Last available data is 6 Jan 2004.**

RLPROF MERGE (Raman Lidar Profiles – Merge)

Description: RLPROFMERGE merges the analog and photon counting channels measured by the Raman lidar. These “merged” profiles are then input to all other RLPROF VAPs. This VAP is required after the RL was upgraded in Sep 2004; data collected prior to this period will not be processed with this code.

WG/Science Sponsor: AWG/David Turner

Translator: Jennifer Comstock

Status: Runs at SGP Central Facility only. Run daily, data up through current unless otherwise noted. **RLPROFMERGE is stopped and undergoing maintenance to understand the diurnal cycle of the coefficients required for merging the analog and photon counting channels. Erroneous data removed from Archive, no data available.**

RLPROF MR (Raman Lidar Profiles – Mixing Ratio)

Description: RLPROF MR computes water vapor mixing ratio profiles using Raman lidar data and RH profiles. It uses MWRLOS precipitable water vapor data as the calibration source.

WG/Science Sponsor: CPWG, AWG, RPWG/Dave Turner

Translator: Jennifer Comstock

Status: Runs at SGP Central Facility only. Run daily, data up through current unless otherwise noted. **RLPROFMR is stopped and undergoing maintenance to interface with the new RLPROFMERGE input files. This VAP will not be turned back on until RLPROFMERGE is released. Last available data is 6 Jan 2004.**

SFC CLD GRID (SGP Area Surface Cloud and SW Radiation Grid)

Description: The Surface Cloud Grid VAP uses as input the 15-minute output from the Shortwave Flux Analysis VAP from the Southern Great Plains (SGP) Central and Extended Facilities. It applies a multi-pass weighted sum analytic approximation technique which uses Gaussian weighting and an imposed scale length, to interpolate to a 0.25 degree by 0.25 degree lat/long grid over the SGP domain. The output, like the input, includes only solar elevation angles of 10 degrees or greater, producing gridded output for cloud fraction, the ratio of measured over clear-sky short wave total (both unshaded pyranometer and sum of direct + diffuse) and direct irradiance, the estimated

clear-sky fit total shortwave irradiance, and the estimated clear-sky fit direct shortwave irradiance. The ratio measured over clear-sky direct shortwave, in conjunction with the total shortwave ratio and clear-sky total and direct irradiance, allows for component evaluation of the irradiance and cloud effects, as well as climatological and statistical research.

WG/Science Sponsor: RPWG/ Chuck Long

Translator: Chuck Long

Status: All SGP Facilities. Currently running operationally monthly, data up through current, 1-2 months after data collection, unless otherwise noted.

SW DIFF CORR (Shortwave Diffuse Correction)

Description: Correction of Diffuse Shortwave Measurements for IR loss. The DIFFCORR1DUTT VAP uses two techniques to correct shortwave (SW) data during daytime hours, using information from a collocated pyrgeometer. Both techniques collect nighttime data with corresponding pyranometer infrared-loss data, and separately fit for two modes: dry and moist. Each mode is detected separately in the nighttime data and applied separately during the daytime as appropriate. The DiffCorr1Dutt VAP output files contain a best estimate of the downwelling SW, and a best estimate of the diffuse SW. In addition, the output files contain other useful values, such as an estimate of the clear-sky Rayleigh diffuse SW amount, and standard surface meteorological measurements. Since ARM stopped using shaded Eppley PSPs in 2001, instead using Eppley model 8-48 "Black and White" pyranometers which do not have a significant IR loss problem, this VAP from the start includes a "retirement" end date for each ARM Facility.

WG/Science Sponsor: RPWG/ Ells Dutton/

Translator: Chuck Long

Status: Due to nature of methodology, requires manual processing on a yearly basis.

All ARM shaded PSP data has been corrected for IR loss with the exception of NSA, where inclusion of heaters in the radiometer ventilators has cast doubt on the applicability of the methodology under those circumstances. Results of the current NSA Radiometer IOP will be used to investigate the applicability, and refine/develop methodology as needed for quantifying and correcting for IR loss with heated ventilation. For SGP and TWP data has been retired.

SW FLUX ANAL (Shortwave Flux Analysis)

Description: The SW (shortwave) Flux Analysis VAP applies a clear-sky detection and fitting technique to data from broadband SW radiometers located at all ARM Facilities. This technique uses hemispheric, broadband total and diffuse shortwave irradiance measurements to identify clear-sky periods using the known characteristics of typical clear-sky irradiance time series. These clear-sky estimates are then used to fit functions for clear periods, interpolate the fit coefficients for cloudy periods, and produce a continuous estimate of clear-sky SW to infer the effect of cloudiness on the measured downwelling SW at 1-minute resolution for daylight hours. The 1-minute resolution analysis also includes data quality assessment that goes beyond standard

min/max/delta and component comparison testing. The SW Flux Analysis VAP also uses a technique to infer average fractional sky cover at 15-minute resolution for solar elevation angles 10° or greater, which is used as input for the Surface Cloud Grid VAP.

WG/Science Sponsor: RPWG/ Chuck Long

Translator: Chuck Long

Status: All ARM Facilities. Currently running operationally monthly, except for Darwin, Australia which requires manual processing. Data up through current, 1-2 months after data collection, unless otherwise noted (i.e. Darwin).

TWR MR (Tower Water-Vapor Mixing Ratio)

Description: The purpose of this algorithm is to calculate water-vapor mixing ratio at the 25- and 60-m levels of the tower at the Southern Great Plains Central Facility.

WG/Science Sponsor: AWG, CPWG/David Turner

Translator: Jennifer Comstock

Status: Currently running on the DMF for SGP only. Run daily, data up through current unless otherwise noted.

ARM Evaluation Product VAPs:

AEROSOL BE (Aerosol Best Estimate)

Description: The Aerosol Best-Estimate VAP provides temporally and spatially continuous vertical profiles of ambient aerosol optical properties including scattering, absorption, and extinction coefficients, single scattering albedo and asymmetry parameter. It uses a combination of passive radiometers, in-situ surface measurements, empirical relationships, climatologies, and model input. It is a direct input to the Broadband Heating Rate Profile (BBHRP) VAP, an ACRF programmatic metric.

WG/Science Sponsor: AWG, Dave Turner

Translator: Flynn

Status: This product has been produced in batch mode for BBHRP milestones at SGP for 2000 and at NSA for 2004. A version will be provided for BBHRP TWP efforts.

BBHRP (Broadband Heating Rate Profile)

Description: The BroadBand Heating Rate Profile (BBHRP) VAP employs output from several different VAPS defining profiles of the atmospheric state, cloud microphysical properties, aerosol properties and surface characteristics as input to a state-of-the-art radiative transfer model. The output of this VAP are profiles of broadband (SW and LW) radiative heating rates.

WG/Science Sponsor: RPWG and CPWG / Eli Mlawer

Translator: Michael Jensen & Chuck Long

Status: A series of BBHRP trials have been performed for the SGP (3/00-2/01) and NSA (3/04-8/04) sites. Current efforts are aimed at improving the input streams at the NSA.

Merged Sounding

Description: The merged sounding VAP uses a combination of observations from radiosonde soundings, the microwave radiometer, surface meteorological instruments and ECMWF model output with a sophisticated scaling/interpolation/smoothing scheme in order to define profiles of the atmospheric thermodynamic state at 1 minute intervals and a total of 266 altitude levels.

WG/Science Sponsor: CPWG / Jay Mace

Translator: Michael Jensen

Status: Merged Sounding is currently operational at BNL in batch mode. Data are available for: SGP – Complete for one year (3/00 – 2/01), NSA – 1/04 thru 12/04, TWP – Manus 2/00-7/00, 10/04; Nauru 3/99-12/99, 10/04; Darwin 10/04, 1/05.

Microbase (Continuous Baseline Microphysical Retrieval)

Description: The continuous baseline microphysical retrieval (MICROBASE) VAP uses a combination of observations from the MMCR, ceilometer, MPL, MWR and balloon-borne sounding profiles in order to determine the profiles of liquid/ice water content liquid/ice cloud particle effective radius and cloud fraction. This baseline retrieval is calculated every 10 seconds and then averaged over twenty minute intervals with a vertical resolution of greater than 230 levels.

WG/Science Sponsor: CPWG/ Mark Miller

Translator: Michael Jensen

Status: The Microbase VAP is currently operational at BNL in batch mode. Data are available for SGP – 3/00 -2/01, NSA prototype – 1/04 thru 12/04, and TWP-C1-11/03 thru 10/04.

MWR RET (Microwave radiometer retrievals)

Description: This VAP provides precipitable water vapor (PWV) and liquid water path (LWP) from the 2-channel microwave radiometer using two advanced retrieval algorithms: a physical-iterative method and a variable-coefficient statistical method. Both methods utilize the monoRTM as the forward model. Additionally, the VAP applies small (<1K) offsets to the observed brightness temperatures in order to reduce the systematic error in the observations and the forward model; these biases are computed directly from the observations. The temperature of the cloud liquid is also accounted for in the retrievals used in this VAP.

WG/Science Sponsor: CP and RPWG / Jim Liljegren and Tony Clough

Translator: Dave Turner

Status: Currently operated manually, with data available for multiple years of data from most of the ARM sites as an ARM Evaluation Product. VAP will be migrated to automated operation in the near future.

VAR ANAL (Variational Analysis Products)

Description: The large-scale forcing and evaluation datasets for SCMs/CRMs. The data were produced from the ARM sounding data (during ARM IOPs) or the RUC analysis data (for the continuous period 1999-2001) constrained with the ARM ground measurements and the NOAA/NASA satellite data using the Variational Analysis method. This VAP depends on data from other VAPs, such as BEFLUX and BAEBBR. The output data are saved in both NetCDF files and ASCII files containing both the SCM domain-averaged forcing data (e.g., the large-scale vertical velocity and advective tendencies of temperature and moisture) and model evaluation data (e.g., surface and top of the atmosphere measurements).

WG/Science Sponsor: CMWG/Minghua Zhang

Translator: Shaocheng Xie

Status: Requires manual operation. Available for all ARM SGP IOPs and the continuous period 1999-2001, 2004 MPACE IOP at NSA. 2006 TWP-ICE IOP variational analysis data will be available by the end of March 2007